Oxides for selective contacts in amorphous/crystalline heterojunction solar cells

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Heterojunction solar cells based on crystalline/amorphous silicon have the actually record of conversion efficiency at 25.l% in transverse configmation. Intrinsic amorphous silicon used in these cells allows to achieve an almost perfèct passivation of silicon crystalline smfàce, while doped amorphous layer is used to collect photogenerated carriers. One of the amorphous silicon drawbacks is the high absorption in the UV-blue region due to its band gap of 1.7eV. This undesired absorption reduces the photogeneration inside crystalline silicon. Moreover, during the celi fabrication process, amorphous silicon does not allow thermal steps at temperature above 200°C, otherwise the passivation quality degrades due to the hydrogen effusion. Recently hydrogenated - non stoichiometric - amorphous silicon oxide, also called a-SiOx:H has actracted interest because of its high band gap of about 2eV together with good conductivity, thermal stability at temperature up to 350°C and very interesting passivation properties. To ensure transparency of emitter layer, the common doped amorphous layers should be replaced by wider gap, suitable workfunction and conductivity emitter layer such as conductive oxide. This of course is stili an open challenge and in this work we present the effectiveness of a-SiOx:H as transparent window and passivation layer, adopted as a buffer in cells having a-Si:H, or doped a-SiOx:H or even MoOx as emitter.